

UNCLASSIFIED

AD NUMBER
AD011417
NEW LIMITATION CHANGE
TO Approved for public release, distribution unlimited
FROM Distribution authorized to U.S. Gov't. agencies and their contractors; Administrative/Operational Use; 20 MAR 1953. Other requests shall be referred to Office of Naval Research, Arlington, VA 22203.
AUTHORITY
ONR ltr dtd 13 Sep 1977

THIS PAGE IS UNCLASSIFIED

Reproduced by

Armed Services Technical Information Agency DOCUMENT SERVICE CENTER

KNOTT BUILDING, DAYTON, 2, OHIO

AD -

11417

UNCLASSIFIED

AMERICAN MUSEUM NOVITATES

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CITY OF NEW YORK MARCH 20, 1953 NUMBER 1611

BIBLIOGRAPHY OF THE NOISES MADE BY MARINE ORGANISMS¹

By W. N. KELLOGG

One of the most exciting developments in comparative psychology and marine biology within the past few years has been the recording and analysis of the under-water noises produced by many of the so-called "silent" organisms of the ocean. Occasional references to biological sounds made in water can be found in the older literature, but the active investigation of the phenomenon has taken place only since the end of World War II. Current interest in the study of under-water animal sounds grew out of listening for enemy vessels developed by the United States Navy in harbors and on ships during the war. Many strange noises of unknown origin (at first thought to be caused by secret enemy weapons) turned out actually to be produced by fishes and crustaceans.

At the present time new organisms are continually being brought to light which make noises of one sort or another, so that the old axiom "silent as the sea" must now be considered a thing of the past. Nevertheless very little is definitely known about the purpose or significance of the noises that are made, and the method of producing them, in the case of many species, is still a matter of speculation.

The literature on the subject is sketchy and widely scattered. To my knowledge no published article has yet appeared in any scientific journal which attempts to bring together the more important references on the under-water sounds made by marine organisms. There are reports by the Office of Naval Research containing such references, at least one of which is an extensive

¹ Contribution No. 6 from the Florida State University Oceanographic Institute.

survey of the field. This is a restricted, or classified, document, however, and is unavailable to the civilian scholar or research worker. The writer has been continually hampered by this lack of any beginning source of information on the subject, and in fact has been asked on several occasions by investigators from other institutions whether such a reference list existed. Finding none available, he decided to do something about it. The resulting bibliography represents a start in this direction, and while it can hardly claim to be exhaustive, it gives the principal sources ordinarily available to a research worker in this country.

Its purpose is to bring together in one place those reports on sound production in marine organisms not classified or restricted for reasons of military or naval security. The reference list, although surprisingly short, represents the greater portion of all that has been published in available journals.

BIBLIOGRAPHY¹

AGASSIZ, J. L.

1850. Manner of producing sounds in catfish and drumfish. Proc. Amer. Acad. Arts, Sci., vol. 2, p. 238.

ANDERSON, A. R.

1894. Note on the sound produced by the ocypode crab, *Ocypode ceratophthalma*. Jour. Asiatic Soc. Bengal, vol. 63, pp. 138-139.

BEDDARD, F. E.

1900. A book of whales. New York, G. P. Putnam's Sons.

BURKENROAD, MARTIN D.

1930. Sound production in the Haemulidae. Copeia, no. 1, pp. 17-18.
1931. Notes on the sound-producing marine fishes of Louisiana. *Ibid.*, no. 1, pp. 20-28.
1947. Production of sound by the fiddler crab, *Uca pugilator* Bosc, with remarks on its nocturnal and mating behavior. Ecology, vol. 28, no. 4, pp. 458-462.

COATES, CHRISTOPHER

1944. Fish talk. Electronics, vol. 17, no. 8, p. 115.

DEMBOWSKI, J.

1925. On the "speech" of the fiddler crab, *Uca pugilator*. Trav. Inst. Niencki 3, vol. 48, pp. 1-7.

DIJKGRAAF, SVEN

1932. Über Lautäusserungen der Elritze. Zeitschr. f. vergl. Physiol., vol. 17, pp. 802-805.

¹ The government reports listed in this bibliography have been declassified. Photostatic or microfilm copies can be obtained from the Publication Board, Scientific and Industrial Reports, Office of Technical Services, United States Department of Commerce, Washington, D. C., with the use of the proper PB numbers.

1947. Ein Töne erzeugender Fisch im Neapler Aquarium. *Experientia*, vol. 3, pp. 493-494.
- DOBRIN, M. B.
1947. Measurements of underwater noise produced by marine life. *Science*, vol. 105, pp. 19-23.
1948. Recording sounds of undersea life. *Trans. New York Acad. Sci.*, pp. 91-96.
- EVEREST, ALTON F., ROBERT W. YOUNG, AND MARTIN W. JOHNSON
1948. Acoustical characteristics of noise produced by snapping shrimp. *Jour. Acoustical Soc. Amer.*, vol. 20, no. 2, pp. 127-149.
- FACCIOLA, LUIGI
1933. L'Ophidion barbatum Linn. e la sua vescica natatoria. *Atti Soc. Italiana Sci. Nat. Mus. Civ. Stor. Nat. Milano*, vol. 72, pp. 157-164.
- FISH, M. P., A. S. KELSEY, Jr., and W. H. MOWBRAY
1952. Studies on the production of underwater sound by North Atlantic coastal fishes. *Jour. Marine Res.*, vol. 11, pp. 180-193.
- FRASER, F. C.
1947. Sound emitted by dolphins. *Nature*, vol. 160, p. 759.
- GREENE, CHAS. W.
1924. Physiological reactions and structure of the vocal apparatus of the California singing fish. *Amer. Jour. Physiol.*, vol. 70, pp. 496-499.
- HARDENBERG, J. D. F.
1933. Over geluidmakende visschen. *Tropische Natuur*, vol. 22, pp. 155-158.
1934. Ein Töne erzeugender Fisch. *Zool. Anz.*, vol. 108, pp. 224-227.
- HOFF, H. B., AND OTHERS
1944. Statistical analysis of Miami area ambient noise survey data. PB 39703, pp. 1-6.
1945. Ambient noise survey, Miami area and east coast of the United States. Completion report. (OSRD Report 5206; JDRC Report 6.1, 1944). PB 31024, pp. 1-43.
- HOLST, E. VON
1934. Studien über Reflexe und Rhythmen beim Goldfisch (*Carassius auratus*). *Zeitschr. f. vergl. Physiol.*, vol. 20, pp. 582-599.
- HULBERT, E. O.
1943. An under water sound of natural origin. *Jour. Acoustical Soc. Amer.*, vol. 14, pp. 173-174.
- VON IHERING, R.
1930. Sur la voix des poissons d'eau douce. *Compt. Rendus Soc. Biol.*, vol. 103, pp. 1327-1328.
- JOHNSON, MARTIN W.
1943. Preliminary survey of certain biological underwater sounds on the east coast of North America. (UCDWR Report 463; NDRC Report 6.1-963), PB 39701, pp. 1-11.
1943. Underwater sounds of biological origin. (UCDWR Report U28), PB 49635, pp. 1-26.
1944. Underwater noise and the distribution of snapping shrimp with special reference to the Asiatic and the southwest and Pacific areas. (UCDWR Report U146), PB 40788, pp. 1-7.

JOHNSON, MARTIN W., F. ALTON EVEREST, AND ROBERT W. YOUNG

1947. The role of snapping shrimp (*Crangon* and *Synalpheus*) in the production of underwater noise in the sea. Biol. Bull., vol. 93, no. 2, pp. 122-138.

JOHNSON, MARTIN W., AND T. F. JOHNSTON

- [n.d.] Ambient water noise in the central and south Pacific. (UCDWR Report M284), PB L 81338, pp. 1-61.

JOHNSON, MARTIN, AND OTHERS

1944. Ambient noise survey, Miami area, supplement. PB 31023, pp. 1-66.

KELLOGG, W. N., ROBERT KOHLER, AND H. N. MORRIS

- [In press.] Porpoise sounds as sonar signals. Science, vol. 117.

KNUDSEN, VERN O., R. S. ALFORD, AND J. W. EMLING

1948. Underwater ambient noise. Jour. Marine Res., vol. 7, pp. 410-429.

KULLENBERG, B.

1947. Sound emitted by dolphins. Nature, vol. 160, p. 648.

LOYE, D. P., AND OTHERS

1943. Key West submarine and water noise measurements. (CUDWR Report cl/R300), PB 81362, pp. 1-28.

LOYE, DONALD P., AND DON A. PROUDFOOT

1946. Underwater noise due to marine life. Jour. Acoustical Soc. Amer., vol. 18, no. 2, pp. 446-449.

MCBRIDE, A. F.

1940. Meet mister porpoise. Nat. Hist., vol. 45, pp. 16-29.

MCBRIDE, A. F., AND D. O. HEBB

1948. Behavior of the captive bottle-nose dolphin, *Tursiops truncatus*. Jour. Comp. Physiol. Psychol., vol. 41, pp. 111-123.

PIETERS, D.

1933. Een luidruchtige visch. Tropische Nat., vol. 22, pp. 39-43.

PROUDFOOT, D. A.

1943. Underwater sound survey--Fishers Island. (CUDWR Report D12 C/R401), PB L 85545, pp. 1-3.

PROUDFOOT, D. A., AND H. B. HOFF

1943. Ambient noise survey, Miami area (First four cruises to Bahamas, Cay Sal Bank, and east coast of Florida). PB 31022, pp. 1-36.

RUMBAUGH, L. H.

1944. Investigations of biological underwater background noises in vicinity of Beaufort, N.C. (NOL Report 880), PB L 66121, pp. 1-48.

1946. Further requirements in oceanographic research for Naval Ordnance application. Trans. Amer. Geophys. Union, vol. 27, pp. 564-566.

SCHVILL, W. E., AND BARBARA LAWRENCE

1949. Underwater listening to the white porpoise (*Delphinapterus leucas*). Science, vol. 109, pp. 143-144.

SINCLAIR, J. G.

1930. Some adaptive features of the porpoise head. Texas Jour. Sci., vol. 2, p. 134.

SMITH, HUGH M.

1905. The drumming of the drum-fishes (Sciaenidae). Science, vol. 22, pp. 376-378.

1927. The so-called musical sole of Siam. Jour. Siamese Soc. Nat. Hist. Suppl., vol. 7, pp. 49-54.

SORENSEN, W.

1894. Are the extrinsic muscles of the air bladder in some Siluroidea and the "elastic spring" apparatus of others subordinate to the voluntary production of sounds, etc. Jour. Anat. Physiol., vol. 29, pp. 110-139, 205-229, 518-552.

TOWER, R. W.

1908. Production of sound in drumfish, toadfish, and searobins. Ann. New York Acad. Sci., vol. 18, pp. 149-180.

TOWNSEND, CHAS. H.

1914. The porpoise in captivity. Zoologica, vol. 1, pp. 208-209.

UNIVERSITY OF CALIFORNIA DIVISION OF WAR RESEARCH

- 1943a. Some ambient water noise measurements in the Thirteenth Naval District. (Report UCDWR M120), PB 40803, pp. 1-9.
- 1943b. Some ambient water noise measurements in the Fourteenth Naval District, with supplement. (Report UCDWR M122), PB 48641, pp. 1-24.
1944. Some ambient water noise measurements in the Fourteenth Naval District, with supplement. (Report UCDWR 122a), PB 48642, pp. 1-4.

VOLZ, P.

1938. Studien über das "Knallen" der Alpheiden nach Untersuchungen an *Alpheus dentipes* Guérin und *Synalpheus laevimanus* Heller. Zeitschr. Morph. u. Ökol. Tiere, vol. 34, no. 2, pp. 272-316.